

unloading. Bulk liquid raw materials unloaded on this pad include phthalate ester plasticizers and organic compounds of arsenic, barium, cadmium, and zinc. This pad is also used to load trucks with used lubricating oil being sent for recycling; and

- ii) the unloading area for the No. 6 fuel oil tank and the No. 2 fuel oil tank HTF is constructed of epoxy coated concrete with a diked enclosure. The pad has a capacity of 12,716 gallons with a sump and will collect the contents of a 5,000-gallon delivery truck and 6 inches of rainwater.

All truck unloading is done in accordance with USDOT regulations. Truck drivers secure all outlet pipes after unloading, which are also checked by facility personnel before they leave the unloading area. Truck drivers remain with the trucks throughout the unloading procedures.

No hazardous materials are delivered or shipped by rail car.

Pigments and solid stabilizers are delivered to the facility in fiber drums and stored in the warehouse or designated weigh-up area until used. Other additives are delivered in paper bags on pallets and are stored in the warehouse until transferred to the process area. Any spilled powders are rapidly swept up. Liquid raw materials and maintenance oils are delivered to the facility receiving warehouse at the west end of the calender facility. There are no open floor drains that would allow a release of spills to the exterior of the buildings. Small volume liquid materials are delivered in drums or in refillable tote bins.

Raw material storage tanks are located alongside the process buildings where materials are used in such a way that pipes are protected from damage. Raw material drums are stored in the plant or plant warehouse. Tote bins of raw materials are stored in a secondary containment concrete-bermed area outside the compound plant. Pipes from fuel oil tanks to the boiler house have sufficient overhead clearance to avoid damage, and are in non-traffic areas. There are no buried pipelines carrying hazardous constituents on the facility.

Drainage from all process areas is directed toward a single outfall, designated Outfall 001A. Spills that may enter the drainage system are contained prior to final outfall.

Further description of materials storage and handling is provided in the following section.

2.2.3 HAZARDOUS MATERIALS STORAGE AND HANDLING

Hazardous materials used at the facility are listed in Table 2.3. The locations and storage vessels are noted for each as reported in the current Discharge Prevention Containment and Countermeasure (DPCC) Plan (August 1998).

All bulk storage tanks that contain a substance considered hazardous under NJAC 7:1E-1.6, are listed under Table 2.3. Each of the bulk above ground storage tanks is located within secondary containment dikes. Each of these are constructed of concrete walls and floors, except for the 300,000-gallon No. 6 fuel oil tank, which is in an earthen dike on a clay floor. Permeability studies on this fuel oil containment structure conclude that a maximum head from a release from this tank would require over 12 days to permeate the clay floor. Secondary containment volumes were designed to collect the contents of the largest tank plus rainwater. Additional containment capacity for the East and Center dikes was obtained by providing for contained overflow between the dikes. Pipes connected to the tanks below liquid level have a readily accessible valve near the tank and within the containment area to minimize the liquid loss in the event of a leak. Each of the tanks in Table 2.3 with a capacity greater than 500 gallons has been subjected to an integrity test. None have had a structural leak.

Calender process equipment are also located within curbs or drip pans or over collection pits where leaked oils are collected for disposal. Drummed liquids are handled far enough from any point of possible exit from the facility that a leak can be contained on Site. There are no open floor drains from the calender facility and raw material warehouse.

Hazardous raw materials are stored indoors until needed for production. Storage for up to 250 drums of liquid raw materials is provided in the calender warehouse, along with a maximum of 80 drums of lubricating oils. Tetrachlorethene (PCE) is used to clean the calender machines. This solvent is purchased in 5-gallon drums, which are kept in the calender building.

Heat transfer oil is stored in drums (maximum of eight) at the boiler house in an area with secondary containment. One drum of sodium hydroxide is stored indoors at the boiler house.

Sodium hypochlorite (12.5 percent solution) used for sanitary wastewater disinfection is delivered in 30-gallon plastic drums and staged on prefabricated containment pads in a building along the sanitary wastewater treatment plant.

Single drums for accumulation of hazardous wastes (motor oil, paint/solvent, and lab solvents) are staged at satellite accumulation areas on prefabricated containment pads. Drums accumulating oil spill cleanup materials are stored indoors. When filled, drums containing hazardous waste are temporarily staged in a bermed concrete containment pad at the south side of the Utility Storage Building.

No drums are stored in areas subject to periodic washout or in areas identified in the 100-year floodplain.

2.2.4 WASTE HANDLING

Wastes generated from the facility include sanitary wastewater and hazardous and non-hazardous wastes. The handling of wastewater is described in Section 2.9.1 under the permitted discharge discussion. Hazardous waste shipments off Site in 1998 are summarized in Table 2.4. These hazardous materials have been sent to Phillips Environmental Services of Hatfield, Pennsylvania for proper treatment and disposal.

Non-hazardous wastes generated include oil spill cleanup material, motor oil and water and grease from maintenance operations, and waste glue, oil, dirt, and debris. These materials have also been shipped to Phillips in Pennsylvania. Bulk oil from boil-off system tank 15 has been shipped to Phillips in New Jersey.

2.3 PRODUCTION PROCESSES (NJAC 7:26E-3.1C1IV)

The initial operations at the facility were the calendering of PVC for the manufacture of sheet and film goods (such as window shades and packaging films). These operations began in 1967 with two calender lines. In the following year, the first phase of the resin facility began production, using a patented bulk polymerization process for the production of PVC. A third calender line was added in 1969. A facility for producing fabrics coated with vinyl and urethane was constructed in 1968-69. A compound facility began production in 1970, making PVC compounds for the pipe and bottle markets. The second phase of the PVC resin facility was constructed and began operation in 1972, doubling the capacity of the facility. The compound facility was expanded in 1973 and

1977. In 1978, the fourth calender line was installed. The locations of these processes are presented on Figure 1.2.

The facility currently manufactures PVC compounds and calendered film and has discontinued the production of PVC resin and embossed or printed fabric. Discontinued operations are described in Section 2.3.1 and current operations are described in Section 2.3.2.

2.3.1 DISCONTINUED OPERATIONS AT SITE

As noted above, two processes have formerly been operated at the facility, but are currently not in use. The resin plant that produced PVC resin at the facility ceased production in July 1990. A fabric embossing and printing process operated until 1976, after which the production equipment was dismantled and sold.

2.3.1.1 PVC RESIN PROCESS

PVC was produced in a two-stage reactor without the use of suspending agents. VCM, a liquefied gas similar to propane, was converted into PVC, a free flowing non-toxic powder. In the first stage (pre-polymerization), VCM was charged with initiator and additives, resulting in a reaction at elevated temperature and pressure under controlled agitation. A small proportion of the VCM was converted to particulate PVC, suspended in liquid VCM. In the second stage (post-polymerization) the particulate was added to VCM, initiator and other additives and the vessel was heated to reaction temperature and pressure. The reaction was halted at 70 percent conversion to PVC and the remaining VCM was stripped off with steam under vacuum. The VCM was condensed in a cooling tower and reused, with unrecovered aqueous VCM incinerated at the facility. The solid PVC was sized by sifting and grinding and transferred pneumatically to other portions of the facility.

The facility had four separate resin production lines to allow for the simultaneous manufacture of different resin types. Each line had one first stage unit, four second stage units, and one sizing and grinding train. Other materials used in this process were organic peroxides, methanol, mineral spirits (solvents), anti-oxidants, nitric acid, and ammonium hydroxide.

2.3.1.2 FABRICS COATING PROCESS

The Fabrics Coating Facility produced urethane or vinyl coated fabric with printed or embossed surfaces for use by the upholstery industry. The process consisted of mixing ingredients with vinyl or urethane in a solvent and applying the mixture on a moving web of fabric and drying it in ovens. The coated fabric was then processed through a continuous color printing operation and/or through heated pressure rollers to emboss a pattern. Sheet vinyl was also processed onto a fabric substrate in a heat and pressure laminating process.

2.3.2 CURRENT OPERATIONS AT SITE

Facility operations currently include the calender process and compounding of PVC. The facility employs 230 persons in production, maintenance, sales, and administration. Production operates in three shifts daily.

2.3.2.1 COMPOUND PROCESS

PVC compounding is performed at two locations: the Compound Plant and the Welex/W.P. Area. High intensity mixing and extrusion are performed at both locations and ribbon blending is also performed at the Welex/W.P. Area. Materials are blended by mixing resin with additives at high speeds to produce a dryblend. The additives are used to adjust the physical properties to impart desired thermal stability, impact resistance, flexibility and color to the final products. The dryblend is cooled and the material sifted to size the particles. Proper sized materials are fed to extruders, where the material is plasticized, extruded, and pelletized for shipment.

Three high intensity mixers and two ribbon blenders are in operation. Five extrusion lines are currently in operation at the Compound Plant and one at the Welex/W.P. Area. Solid materials are handled in supersacks or bags and liquids in drums or tote-bins.

2.3.2.2 CALENDER PROCESS

Two calender lines are currently in use to produce film and sheeting for semi-rigid applications. Resin is delivered in bulk, weighed, and transferred to a ribbon blender, where liquid plasticizer, fillers, and other components are added. The batch is heated with steam on the ribbon blender until all of the plasticizer is absorbed, producing a

dryblend. The material is then fed to mixers to produce plasticized blends. The blends are fed to two-roll mills, which roll the mixture. The blend then proceeds through a strainer-extruder and then to the calender line. The calender rolls the blends into 36 to 72-inch wide sheets. After calendering, the film is wound and wrapped for shipment. Defective film is returned to the ribbon blenders or the mills for reprocessing.

2.3.2.3 SITE UTILITIES

Site utilities provide potable water, steam, cooling water, sewage treatment and equipment maintenance for the facility. Potable water is provided by two production wells located at the southeast corner of the property. Steam at the boiler is normally generated by natural gas, with backup heating with No. 6 fuel oil. The fuel oil is stored in a 300,000-gallon aboveground tank.

Sanitary wastewater is treated by an extended aeration treatment facility with a 20,000-gallon per day operating capacity. The treatment facility became operational in 1967. The treatment process, shown schematically on Figure 2.1, includes:

- i) four extended aeration basins in series followed by;
- ii) settling followed by;
- iii) disinfection using two chlorine contact chambers.

On average, approximately 3,000 gallons per day (gpd) are treated and discharged to Outfall 001A under NJDEP Permit No. NJ0004235. No process wastes are treated within this treatment facility.

The boiler house provides heat transfer oil for the calender facility.

2.4 STORAGE TANKS (NJAC 7:26E-3.1C1V)

All materials defined by NJDEP as hazardous (NJAC 7:1E) are stored in bulk storage tanks with secondary containment. The tanks used at the facility are listed in Table 2.3 with contents, volume, secondary containment and their location. All tanks are constructed of material compatible with the material stored and materials are non-corrosive. Integrity testing is scheduled for a point 5 years after static head testing. Tanks have automatic alarms to indicate when contents are at high levels. Empty tanks

formerly used for VCM, gasoline, and sodium hydroxide are out of service and not expected to be used.

Four underground storage tanks were formerly in use at the facility. These were registered with the NJ BUST program, as noted below. None of these tanks remain active, having been taken out of service and abandoned. Table 2.5 presents a summary of the tank size, use, location, and status for the underground tanks.

2.5 AERIAL PHOTOGRAPHY INTERPRETATION **(NJAC 7:26E-3.1C1VI)**

Aerial photography of the property has been reviewed covering the interval from 1940 to 1991. This represents a range of time required by the NJDEP from pre-industrial period through the current ownership and industrial use. A synopsis of the Site features evident on the photography is presented in Table 2.6.

2.6 KNOWN DISCHARGES (NJAC 7:26E-3.1C1VII)

Reportable discharges at the facility are presented in Appendix A. In general, these releases have either been very minor or have been contained without impact to soil or groundwater. In a few cases, contaminated soil materials have been excavated and removed for off-Site treatment and disposal; these instances have mainly involved the release of hydrocarbons. Other releases, which are known or suspected chronic releases, include the release of condensate water from the VCM recovery system to the surrounding ground surface, and the potential release of PCE used for cleaning of the calender equipment. PCBs have also been released to surficial runoff ditches from heat exchange oils in use prior to 1978. These releases are being addressed as a part of the DGW permit and other investigations being coordinated with NJDEP.

2.7 REMEDIALATION PROJECTS PREVIOUSLY PERFORMED, **CURRENTLY BEING PERFORMED, OR APPROVED BY** **DEPARTMENT (NJAC 7:26E-3.1C1VIII) AND 3.1C1IX)**

No remediation projects have been performed or approved by the NJDEP at this facility. The only environmental conditions reviewed by NJDEP at the facility have been related to discharges to air, surface water and groundwater (see Sections 2.6, 2.9, and 2.10). The air discharge issues (mainly VCM releases) were addressed as indicated in Section 2.10, and were made moot by the cessation of resin manufacturing in 1990. Permits issued to

the facility by NJDEP (see Section 2.9) have addressed discharges to surface water and groundwater. Remediation projects have been identified for PCB-impacted sediments, but have yet to be completed pending the establishment of a remediation goal (anticipated 1999).

2.8 EXISTING ENVIRONMENTAL DATA AND KNOWN CHANGES SINCE COLLECTION (NJAC 7:26E-3.1C1X AND 3.1C1XI)

Environmental data have been generated at the facility during the performance of numerous investigations (listed in Table 3.2). These data are presented in Tables 4.4 through 4.6 and are discussed further in Section 4.0.

2.9 PERMITS (NJAC 7:26E-3.1C1XII)

2.9.1 PERMIT TO DISCHARGE TO SURFACE WATER AND GROUNDWATER

A permit was issued to OCC by the NJDEP to discharge treated industrial water to Bustleton Creek. This permit was issued by NJDEP under the New Jersey Pollutant Discharge Elimination System (NJPDDES) program as Permit NJ0004235. This permit provides for discharge limits to Outfall No. 001A for effluent from sanitary sewage treatment, as well as non-contact cooling water, boiler blow down water, and storm water from the facility. The Outfall is located approximately 1,800 feet upstream of the confluence of Bustleton Creek with the Delaware River. A module covering discharge to groundwater (DGW) was included with the discharge to surface water (DSW) permit in 1988 to provide for quarterly monitoring of groundwater quality. Both permits were renewed in 1995. The permit requires monitoring of the surface water discharge for temperature, biochemical oxygen demand, chemical oxygen demand, pH, total suspended solids, total dissolved solids, oil and grease, flow, and chloride.

Discharged waters are conveyed by open ditches to the combined Outfall on the adjacent property to the south on Bustleton Creek. A western ditch collects stormwater from non-process areas (warehouse and parking) in that portion of the facility. A central ditch collects stormwater from the area of the Administration Building and conveys it by a closed pipe to an open ditch leading to the Outfall. An eastern ditch collects stormwater from the eastern side of the facility and conveys it by an underground pipe to an open ditch along the former resin plant. The lower part of the eastern ditch connects with a southern ditch. The southern ditch flows westward toward the Outfall.

The southern ditch also conveys the discharge from the sanitary package treatment plant. Blow down from the boiler house is also discharged to the eastern ditch. This includes continuous blow down from the boiler, and periodic (once or twice per week) discharges from the boiler regeneration. The discharge is monitored for oil and grease on a monthly basis to verify that these discharges do not exceed allowable limits. The central and eastern ditches also convey non-contact cooling waters for discharge.

The wastewater treatment system operates well. There have been only a few temporary exceedances of discharge limits, mainly for residual chloride being used to disinfect the sanitary sewage waste stream. Groundwater monitoring required by the DGW module of the permit has shown that VCM and PCE are present but decreasing with time. The groundwater flows to the Bustleton Creek at the southern margin of the facility. The concentrations of these two analytes have been decreasing during the past 10 years of quarterly monitoring.

No other wastewaters are discharged from the facility.

2.9.2 AIR DISCHARGE PERMITS

A total of 102 stacks had been issued certificates for discharge by NJDEP. Of these, 24 were associated with the now closed resin plant. As of February 1997 the facility has developed and submitted an application for a Title V operating permit in accordance with the provisions of the New Jersey Administrative Code under Facility ID 45028. OCC was notified on May 27, 1997 that the application has been accepted as administratively complete. Currently the permit application is under technical review. Four of the stacks have been assigned annual emissions limitations; these are monitored monthly and reported annually.

2.9.3 RCRA PERMITS

The facility is a RCRA Small Quantity Generator Identification Number (NJD043973122) for the generation of wastes described in Section 2.2.4. There are no treatment, storage or disposal units at the facility. All hazardous waste is properly disposed of in less than 90 days from generation.

2.9.4 OTHER PERMITS

Other permits held by the facility include a NJDEP Water Allocation Permit No. 2229P for two potable water wells that service the facility. The facility also holds a permit from the NRC (29-17465-02 for beta gauge instruments to measure film thickness) and formerly held a permit from the NJ Bureau of Underground Storage Tanks (No. 0020233).

2.10 ENFORCEMENT ACTIONS (NJAC 7:26E-3.1C1XIII)

In general, the facility has been in compliance with permit requirements. A number of enforcement actions have been taken in the past, mainly for historic releases of VCM (when the resin process was in operation) or for administrative requirements of RCRA. Appendix B lists these past actions. Each of these issues has been resolved with the appropriate agency and the facility currently has no enforcement actions in effect.

Although not strictly an enforcement action, two other releases have precipitated long-term follow up work at the facility. Plans for an addition to the facility in the early 1980s resulted in a request for an environmental baseline and impact study from Bustleton Township. Sampling of the Bustleton Creek detected the presence of VCM. Subsequent groundwater investigations identified the presence of VCM and PCE in the groundwater. The DGW module of the NJPDES permit has required the quarterly monitoring of the groundwater for these parameters.

Maintenance of the surface ditch system in the late 1980s included the characterization of sediments prior to their removal. This sampling identified PCBs to be present. Additional sampling and analysis described in Section 5.1 has been performed to delineate the PCBs for subsequent remedial action.

2.11 FILL PLACEMENT (NJAC 7:26E-3.1C1XIV)

Dredge spoils from the Delaware River were reportedly placed on the facility property in 1956. Based on the review of aerial photography presented in Section 2.5, the spoils were placed on the central portion of the facility property (see Figure 1.2). This fill was also placed elsewhere along the river, including on the properties to the south. An aerial photography review performed by others in a report on the adjacent property to the south concluded that large areas of dredge spoils were evident on both sides of Bustleton Creek in 1965 (Environ December, 1997). The delineation of spoil fill areas in

that evaluation encompassed virtually the entire OCC production area as well as the area west of River Road along the Delaware River. The spoils consist of river sediment from the central ship channel. The chemical composition of the materials has not been documented or otherwise identified to be of concern. These materials do not reflect the use of the property by the owner or industrial use of the land.

No other fill materials are known to have been placed on this property, other than small piles of graded material from plant construction at the eastern margin of the resin process area. No known chemical components are contained in any fill placed on Site.

2.12 WELL SURVEY (NJAC 7:26E-4.4H3V)

To be provided when survey results are received from the NJDEP.

3.0 SITE GEOLOGY AND HYDROGEOLOGY

Over the years, an extensive database has been compiled regarding the geology and hydrogeology of the Plant area. The database came from many sources and included several phases of work. The list of documents pertaining to the environmental investigations and the groundwater and surface water sampling are summarized in Table 3.1. The environmental investigations were conducted in three phases as summarized in Table 3.2.

From this database, the following understanding of the Site geologic and hydrogeologic conditions were developed.

3.1 SITE GEOLOGY

The Site geology has been defined through three primary investigations. These investigations include:

- i) a geotechnical study conducted by Dames & Moore in 1959;
- ii) a groundwater availability study conducted by Geraghty and Miller in 1966; and
- iii) environmental investigations conducted by Leggette, Brashears & Graham (LBG) between 1982 and 1988.

The 1982 to 1988 environmental investigations included the installation of 27 temporary monitoring wells, 18 permanent monitoring wells (at nine locations), the performance of recovery tests, and the collection of groundwater and surface water level measurements.

Based on these extensive investigations, the geology of the Site has been well defined. Three major stratigraphic units have been identified beneath the Site (two unconsolidated and one bedrock). The two unconsolidated units can be subdivided into five sub-units. The Site geology is consistent with the regional geology described in Section 1.4.2. The Site geologic units, along with the regional equivalents, are described below:

<i>Site Geologic Unit</i>	<i>Site Geologic Sub-Unit</i>	<i>Regional Geologic Unit</i>
Glacio-Fluvial Unit	Brown Sand Sub-Unit Sand and Gravel Sub-Unit Sandy Clay Sub-Unit	Cape May Formation
Raritan Formation	Red Clay Sub-Unit Sand Sub-Unit	Raritan Formation
Bedrock		Basement Rock

Each of geologic units is described below. A detailed geologic cross-section has been prepared from the Site-borehole data and is shown on Figure 3.2. The location of the cross-section is shown on Figure 3.1.

Glacio-Fluvial Unit

The uppermost geologic unit at the Site is the Glacio-Fluvial Unit. This unit is equivalent to the Cape May Formation. As noted above, this major unit can be subdivided into three sub-units. The uppermost sub-unit is a brown sand. This sub-unit consists primarily of fine to medium brown sand with some interbeds of gravel and clay. This sub-unit is continuous across the Site, and varies in thickness from 13 feet (TW-10) to 27 feet (TW-3).

Immediately below the Brown Sand Sub-Unit is the Sand and Gravel Sub-Unit. This sub-unit consists of sand mixed with varying percentages of gravel and cobbles. This sub-unit also contains discontinuous lenses of clay at some locations. The sand and gravel is also continuous across the Site and ranges in thickness from 10 feet (TW-9) to 30 feet (PW-2).

The lowermost sub-unit consists of the Sandy Clay Sub-Unit. This sub-unit is made up primarily of yellow and white clay with varying percentages of silt and sand. This unit also contains discontinuous lenses of fine sand. This sub-unit is continuous across the Site and varies in thickness from 8 feet (TW-8) to 42 feet (02-66). The elevation of the top of the Sandy Clay Sub-Unit is shown on Figure 3.3.

Raritan Formation

The unconsolidated sediments of the Raritan Formation underlie the Glacio-Fluvial Unit across the entire Site. The uppermost sub-unit of the Raritan Formation is a red and

white clay. This clay was encountered in all boreholes at the Site and was fully penetrated in six boreholes completed as part of the groundwater availability study. These boreholes were completed as test wells and/or piezometers. The thickness of this unit ranges from 30 to 45 feet.

Beneath the Red and White Clay, is the Sub-Sand Unit of the Raritan Formation. This unit consists primarily of sand; but does include a clay lens. The Sand Sub-Unit is approximately 80 feet thick.

Bedrock

Underlying the Raritan Formation is the bedrock. These basement rocks consist of metamorphosed schist. The bedrock represents the base of the area of interest.

3.2 SITE HYDROGEOLOGY

Three principal hydrogeologic units are present in the unconsolidated sediment beneath the Site. In descending order the principal hydrogeologic units and their corresponding geologic units are:

<i>Hydrogeologic Unit</i>	<i>Corresponding Geologic Unit</i>
Shallow Aquifer	Brown Sand/ Sand and Gravel Sub-Units
Confining Clay	Sandy Clay Sub-Unit Red Clay Sub-Unit
Potomac-Raritan-Magothy Aquifer	Sand Unit

The details of these hydrogeologic units are described below. The distribution of these hydrogeologic units is generally consistent across the Site, as shown on Figure 3.4, a hydrogeologic cross-section through the Site. Groundwater level measurements for the Shallow Aquifer for the third and fourth quarter of 1997 and the four quarters of 1998 are provided in Table 3.3. Based on these data, groundwater contours for the Shallow Aquifer have been prepared and are shown on Figures 3.5 to 3.12. The groundwater levels and contours shown on these figures have been revised to concur with the results of the survey performed in January 1999 which is described in Section 5.4. Details of the

monitoring wells from which these groundwater level measurements have been taken, are presented in Table 3.4.

Shallow Aquifer

The Shallow Aquifer has been the main focus of environmental hydrogeologic investigations. The Shallow Aquifer occurs within the glaciofluvial sediments of the Cape May Formation and consists of a mixture of sand, gravel, and cobbles with some clay lenses. The Shallow Aquifer is continuous across the Site, varying in thickness from 20 to 60 feet. The average thickness of the Shallow Aquifer in the vicinity of the Site is 35 feet.

Based on a soil porosity of 30 percent, the calculated average groundwater flow velocity across the Site is approximately 1 foot per day. The vertical hydraulic gradients within the Shallow Aquifer in the vicinity of the Site are primarily downward, and are minimal in magnitude. The vertical hydraulic gradient data for the Site are presented in Table 3.3. On-Site recharge to the Shallow Aquifer occurs from the infiltration of precipitation as well as groundwater flow from upgradient areas. Shallow Aquifer groundwater flows toward and discharges to Bustleton Creek and the Delaware River.

Extensive investigations were conducted by Leggette, Brashears and Graham, on behalf of OCC in 1987. Hydraulic monitoring in monitoring wells MW-6S/6D (north of the creek) and MW-7S/7D (south of the creek) and in the creek itself was undertaken. The resulting hydrographs from this monitoring are presented in Appendix D. Examination of these hydrographs shows that groundwater levels on both sides of the creek are higher than the creek water levels. This occurs during all tidal phases, which indicates that although the magnitude of the hydraulic gradient is influenced by tidal fluctuations, the direction of groundwater flow remains toward the creek.. Therefore, Bustleton Creek is a discharge area for the Shallow Aquifer. Further evidence of discharge to Bustleton Creek is the absence of Site-related chemicals in monitoring wells MW-7S/7D.

The hydrographs in Appendix D show the tidal influence on the Bustleton Creek surface water levels and on the groundwater levels in wells MW-3S/3D, MW-4S/4D, MW-6S/D, MW-7S/7D, and TW-10 and TW-20. The hydrographs show that in the vicinity of the Outfall to Bustleton Creek, the surface water has a tidal effect of approximately 2.3 feet between high and low tide. The tidal influence on groundwater levels in the above-listed wells were:

<i>Well</i>	<i>Approximate Distance to Creek (feet)</i>	<i>Change in Groundwater Level (feet)</i>
MW-3S	210	0.25
MW-3D	200	0.35
MW-4S	450	0.1
MW-4D	450	0.1
MW-6S	100	0.3
MW-6D	100	0.3
MW-7S	50	0.0
MW-7D	50	0.4
TW-10	390	0.0
TW-20	740	0.1

The above results generally show a decrease in the magnitude of groundwater level response to tidal influence with increasing distance from Bustleton Creek, except for well TW-20. Well TW-20 was the well located closest to the Delaware River of the above wells. The observed response at TW-20 may be due to the combined tidal effect of Bustleton Creek and the Delaware River. The lack of response at MW-7S and TW-10 may indicate the presence of localized zones of reduced permeability around these well screens.

Confining Clay

The Confining Clay unit is comprised of the Sandy Clay and Red Clay Sub-Units and is continuous across the entire Site. The Confining Clay was encountered in all boreholes in the vicinity of the production areas, which confirmed the continuity of the Confining Clay across the Site. The thickness of the Confining Clay is up to 70 feet. This unit thins in a westerly direction (see Figure 3.4) toward the Delaware River where it was not observed (as expected since the River serves as the main recharge to the Potomac-Raritan-Magothy Aquifer). The Confining Clay separates the Shallow Aquifer from the underlying regional aquifer (i.e., the Potomac-Raritan-Magothy Aquifer) described below.

Potomac-Raritan-Magothy Aquifer

The Potomac-Raritan-Magothy (PRM) Aquifer is a regionally important water supply aquifer. The PRM consists of the Sand Sub-Unit of the Raritan Formations and is equivalent to the "Middle Formations Aquifer" as defined by Zapeca (1989). The PRM Aquifer outcrops at the Delaware River immediately west of the Site and is encountered

at a depth of 100 feet below ground surface (bgs) in the eastern portion of the Site. The thickness of the PRM ranges from 80 feet near the Delaware River to 90 feet at the eastern edge of the Site (see Figure 3.4). Recharge to the PRM is received from the Shallow Aquifer through the Confining Clay (although minor in nature) and through infiltration from the Delaware River, to which the PRM is hydraulically connected.

Summary

The geology and hydrogeology at the Site have been well defined. The groundwater migration pathway is also well defined and the evidence supporting the discharge of all the groundwater flow from the shallow aquifer to Bustleton Creek and the Delaware River is conclusive and has been accepted by the NJDEP.

4.0 POTENTIAL AREAS OF CONCERN (NJAC 7:26E-3.2 A3IV)

The investigations conducted in the 1980s and the ongoing monitoring programs have identified the following potential areas of concern at the Site:

- i) the PCB presence in the sediment of the on-Site ditches;
- ii) the VOC presence in the on-Site groundwater regime and Bustleton Creek surface water; and
- iii) the potential source area soils.

The significance of the presence of each of these areas of concern and potential areas of concern including a discussion of possible and known sources is presented in the following sections.

4.1 DITCH SEDIMENTS/PCBs

Up until mid-1987, wastewater from Plant processes, including upwards of 86,000 gpd of compound facility vacuum seal wastewater, was discharged to a ditch conveyance system under the NJPDES permit. The location of the ditch conveyance system is shown on Figure 1.2. Over a period of time, sediments would accumulate in the bottom of the ditch. These sediments were removed from the ditch on a periodic basis but only after sampling had been performed to properly characterize the sediments. In preparation for removing sediments from the ditch in September 1988, a five point composite sample was collected from the ditch to determine if chemical constituents were present. PCBs were found to be present in these samples.

The PCB results of the initial sampling events from September and November 1988 identified Aroclor 1242 to be present. The analytical results for this sample round are shown in Table 4.1. Based on these results, OCC conducted two sampling events in early 1989 to further define PCB sediments in the ditch conveyance system.

Samples from six locations along the ditch were collected in January 1989. Samples were collected from 0- to 12-, 12- to 24-, and 24- to 36-inch depths. Sample locations are shown on Figure 4.1. The analytical results are presented in Table 4.2. Aroclor 1242 was the only PCB detected and was detected in 6 of the 13 samples collected at concentrations ranging from 0.72 to 110 mg/kg.

Additional samples were collected from 14 locations along the ditch in March 1990. The samples were collected at depths ranging from 1 to 4 feet. Sample locations are shown on Figure 4.1. The analytical results are presented in Table 4.3. Aroclor 1242 was the only PCB detected and was detected in 23 of the 30 samples collected at concentrations ranging from 0.4 to 200 mg/kg.

The sampling results show that the majority of Aroclor 1242 presence is found in the Resin Ditch. Concentrations in the Resin Ditch ranged between not detected and 200 mg/kg. Concentrations in the South Ditch were generally one to two orders of magnitude lower than in the Resin Ditch. The concentrations in the South Ditch ranged between not detected and 21 mg/kg.

The PCB analytical results are shown in cross-section on Figures 4.2 and 4.3 for the Resin Ditch and South Ditch, respectively.

Potential PCB sources at the Site have been eliminated, as described below, except for the recovery transformer. The compound facility process stream ceased to discharge to the ditch in mid-1987. A summary of the transformers with PCBs, the concentration of PCB in the transformer fluid, and the dates of oil replacement are shown below. The oil in the main transformer was not replaced. Instead, the PCB concentration was reduced to less than 50 mg/kg.

<i>Transformer</i>	<i>PCB Concentration (mg/kg)</i>	<i>Date of Oil Replacement</i>
Fabric Transformer	4,770	June 1988
Silo/Compound Transformer	270	August 1993
Utility Transformer	3,200	July 1997
Main Transformer	1,850	November 1998
Recovery Transformer	13,900	Reduced <50 mg/kg

The PCB concentrations in the main transformer fluids were reduced on June 23, 1998 in an attempt to decrease the PCB concentration to below 50 mg/kg. The first attempt was not successful in reducing the PCB concentrations to this level. A second attempt, performed on November 7, 1998, was successful. The PCBs removed from the transformer fluid were shipped under a New Jersey Hazardous Waste Manifest to the Sun Ohio facility in Canton, Ohio.

The sediments removed from the ditch were temporarily stockpiled in two piles in the area of the obsolete equipment storage area prior to off-Site disposal. Each of these piles

was reportedly set on plastic sheeting. As reported in the Preliminary Assessment, samples were collected from each of the two areas at the Site where sediments previously removed from the ditch were stockpiled. PCBs were not detected in the first stockpile area but Aroclor 1242 was detected in the second stockpile area at a concentration of 84 mg/kg. The specific locations of these former stockpiles (since removed and disposed) can not be identified.

The PCB analytical results show that the PCB concentrations in excess of 25 mg/kg (a Toxic Substances Control Act remediation standard for PCB releases) were present in most of the Resin Ditch and in one sediment stockpile area. The NJDEP was notified by OCC of the PCB presence in these areas in a letter dated February 13, 1989. A response from NJDEP was not received by OCC. Therefore, remedial activities to address the PCB presence in the ditch sediments were not implemented.

In summary, the PCB presence described above showed:

- i) Aroclor 1242 was detected in the Resin Ditch at concentrations that ranged between not detected and 200 mg/kg;
- ii) Aroclor 1242 was detected in the South Ditch at concentrations that ranged between not detected and 21 mg/kg;
- iii) one of the two sediment stockpile areas contained a detectable Aroclor 1242 concentration of 84 mg/kg;
- iv) PCBs were not detected in Site groundwater monitoring wells; and
- v) PCBs were not detected in surface water samples.

4.1.1 POTENTIAL SOURCE

The source of PCB presence in the ditch conveyance system is believed to be spills or leakage of oil during maintenance of heat transfer units formerly located in the northwest corner of the Compound Building. It is reported that the floor drains in the Compound Building historically drained to the ditch (i.e., Resin Ditch) located east of the Compound Building. Sediment sampling in July 1987 showed that PCBs were not present in the ditch sediments whereas the September 1988 showed PCBs were present. Thus, the ditch sediments were impacted by PCBs during this time period.